

Lead frames 16 through 30 are arranged in such a manner that unwanted noise via coupling in an EIA RJ45 T568B system having standard plug positions 1, 2, 3, 4, 5, 6, 7 and 8, is reduced in comparison to the standard RJ45 modular inserts. Such advantageous reduction according to the present disclosure is primarily achieved because standard RJ45 modular inserts typically have plug positions and lead frames that disadvantageously remain parallel and adjacent throughout the insert.

Referring to Figure 3, lead frames 18, 22, 26 and 30 associated with lower portion 14 are shown in their respective positions outside of insert 10. Preferably, second end portion 35 of lead frame 18 is approximately twice the length of its first end portion 41, more preferably about 0.80 inches. Second end portion 35 of lead frame 18 includes a lead frame direction-altering segment 64 which extends from lead frame 18 at an angle 66 and in a direction that transverses the longitudinal axis 68 of elongated lead frame 18. Segment 64 also extends in a direction away from the position of lead frame 22 with respect to lead frame 18. Preferably, angle 66 is about 90 degrees with respect to longitudinal axis 68 of lead frame 18. Second end portion 35 of lead frame 22 includes segment 70 which extends from lead frame 22 at an angle 72 and in a direction that transverses longitudinal axis 68 of lead frame 22.

Segment 70 is directed away from the position of lead frame 18 with respect to lead frame 22. Second end portion 35 of lead frame 26 includes segment 74 which extends from lead frame 26 at an angle 76 and in a direction that transverses longitudinal axis 68 of lead frame 26. Segment 74 is directed away from the position of lead frame 22 with respect to lead frame 26. Second end portion 35 of lead frame 30 includes segment 78 which extends from lead frame 30 at an angle 80 and in a direction that transverses longitudinal axis 68 of lead frame 30. Preferably, angle 80 is greater than 90 degrees. Segment 78 is directed away from the position of lead frame 26 with respect to lead frame 30.

Figure 4 illustrates the curvature of body portion 33 in lead frames 18, 22, 26 and 30. Lead frames 18, 22, 26 and 30 are parallel along longitudinal axis 68 and are curved upward with respect to insert 10 at an angle 82. Preferably, angle 82 is about 30 degrees.

5 According to the present disclosure, angle 82 advantageously provides for the pre-load stress of mating with a plug and increases the lead frame contact force to an estimated 100 grams or more, among other things.

Referring to Figure 5, lead frames 16, 20, 24 and 28 associated with upper portion 12 are shown in their respective positions outside of insert 10. Preferably, second end portion 35 of lead frame 28 is approximately twice the length of its first end portion 41, more preferably about 0.80 inches. Second end portion 35 of lead frame 28 includes a direction-altering segment 84 which extends from lead frame 28 at an angle 86 and in a direction that transverses the longitudinal axis 68 of elongated lead frame 28. Segment 84
15 also extends in a direction away from the position of lead frame 24 with respect to lead frame 28. Preferably, angle 86 is about 90 degrees with respect to longitudinal axis 68 of lead frame 30. Second end portion 35 of lead frame 24 includes segment 88 which extends from lead frame 24 at an angle 90 and in a direction that transverses longitudinal axis 68 of lead frame 26.

20 Segment 88 is directed away from the position of lead frame 24 with respect to lead frame 28. Second end portion 35 of lead frame 20 includes segment 92 which extends from lead frame 26 at an angle 94 and in a direction that transverses longitudinal axis 68 of lead frame 20. Preferably, angle 94 is about 90 degrees. Segment 94 is directed away
25 from the position of lead frame 24 with respect to lead frame 20. Second end portion 35 of lead frame 16 includes segment 96 which extends from lead frame 16 at an angle 98 and in a direction that transverses longitudinal axis 68 of lead frame 16. Preferably, angle 98 is greater than 90 degrees. Segment 96 is directed away from the position of lead frame 20 with respect to lead frame 16.

Figure 6 illustrates the curvature of body portion 33 in lead frames 16, 20, 24 and 28. Lead frames 16, 20, 24 and 28 are parallel along longitudinal axis 68 and are curved upward with respect to insert 10 at an angle 100. Preferably, angle 100 is about 10 degrees. According to the present disclosure, angle 100 provides for the pre-load stress of mating with a plug and increases the lead frame contact force to an estimated 100 grams or more, among other things.

As illustrated in Figures 7, 8 and 10, inclusion of the various direction-altering segments in lead frames 16 through 30 results in placement of pins 42 at end 35. Such placement does not necessarily reflect the relative order of lead frames 16 through 30 at end 41.

Figure 9 illustrates the difference in angles 82 and 100 between lead frames 18, 22, 26 and 30 associated with lower portion 14 and lead frames 16, 20, 24 and 28 associated with upper portion 12, respectively. The RJ45 plug electrical contacts meet with contact portions 34. Contact portions 34 are at substantially the same distance away from surface 36 and at the same location near the midpoint of insert 10 for all lead frames 16 through 30. These factors aid in reducing unwanted noise reactances, among other things.

Figure 12 illustrates an example of insert 10 in use. Insert 10 is secured in modular housing 102 of a standard type used in a multitude of conventional electronic applications, such as for connecting to a network wall outlet, computer, or other data transfer device. Modular housing 102 with insert 10 is electrically connected to a printed circuit board ("PCB") 104 which may also contain signal transmission traces and/or extra coupling circuitry for re-balancing signals. Signals transfer from UTP cable 106 and into insert 10 through RJ45 type plug 108. As illustrated in Figure 13, the signal from cable 106 is transmitted via plug contacts 114 in plug 108, which make electrical contact substantially at contact portions 34 on lead frames 16 through 30. Each pair of plug contacts 114 mates